A Work Project, presented as part of the requirements for the Award of a Master Degree in Finance from the NOVA – School of Business and Economics

Field Lab Research:

Nova Student's Portfolio (NSP)

Introducing Spin-Off Stocks into the NSP's Risk Parity Strategy

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Abstract

This Field Lab Research will attempt to improve the Nova Student's Portfolio's (NSP) current investment strategy through the use of spin off stocks. Studies have shown that spin off issuances tend to outperform the broad market as they are inefficiently introduced into the marketplace. This research will try and draw upon this relative outperformance by introducing spin off securities into the NSP's investment thesis. This shall be accomplished in two main ways: the first part of this research will focus more on the risk parity portion of the strategy as broad exposure to spin offs shall be introduced in an attempt to improve the current risk parity portfolio. The second part of this research will look to the stock picking aspect of the NSP's strategy. In other words, an investment thesis will be introduced with the objective of picking out certain spin off opportunities. The main objective of this research will be to increase the Sharpe ratio of the entire strategy and the average annual return of the portfolio.

Introduction

The Nova Student's Portfolio is a student run fund that invests only in US markets with assets under management of around $300,000. The NSP's investment thesis relies upon two distinctive parts, a risk parity portfolio part and an active stocking picking part. The risk parity portfolio is comprised of the S&P 500 ETF, the PIMCO Total Return Active ETF as well as a future contract on a 5 year Treasury note. The stock picking part is then introduced as NSP analysts present their stock picking ideas to the investment committee. If a stock is approved, by ascertaining more than 50% of the votes, the stock is introduced into the portfolio with a weighting of around 1% which is removed from the S&P 500 ETF.

A more detailed analysis into spin off securities will be addressed further on but first a comparison shall be conducted to check whether a spin off risk parity portfolio is more efficient than the current S&P 500 risk parity portfolio.

I. Comparison of Spin off Risk Parity against S&P 500 Risk Parity

Firstly, before presenting a comparison of the two portfolios, the construction of the portfolio shall be explained. Data on prices begins on 19th of June 2006 until 30th July 2015, which is virtually nine years of data, the reason for this date is that this is the common inception between all assets. Furthermore, the following assets were used for the spin off risk parity portfolio: the Guggenheim Spin-Off ETF (CSD US Equity), the PIMCO Total Return Active ETF (BOND US Equity) and the 5-Year US Treasury note Futures (FV1 Comdty). Moreover, it is important to note that the price data for the ETFs was not available for the full period of this analysis. So to rectify this absence of data two indices were added as proxies. For the Guggenheim Spin-Off ETF, the Beacon Spin-Off Index (CLRSOTR Index) was used, and for the PIMCO total return fund, the Barclays US Aggregate Total Return Index was used (LBUSTRU Index). The Beacon Spin-Off Index is the correct proxy because, according to the Guggenheim's Spin-Off ETF's prospectus, they seek investment results that correspond to the performance of the Beacon Spin-Off Total Return Index. Traditionally with a risk parity approach a target standard deviation is set for the entirety of the portfolio, in this case the target standard deviation for the portfolio was set at 5.5%. From the annualized standard deviation previously calculated, a target weight can be calculated for each asset by dividing the target volatility by the historical annualized volatility. The table below illustrates part of the results obtained:

Target Volatility			5,50%	
	Guggenheim Spin-Off ETF		PIMCO Total Return Active ETF	
Date	20 Day Vol Annualized	Target Vol / Hist Vol	20 Day Vol Annualized	Target Vol / Hist Vol
18-Jul-06	14,99%	36,69%	2,76%	199,22%
19-Jul-06	15,24%	36,10%	2,96%	185,60%
20-Jul-06	15,28%	36,00%	3,26%	168,91%
21-Jul-06	16,87%	32,60%	3,16%	174,25%

As can be seen above the 36.69% weight is calculated by the division of 5.5% / 14.99%. To ensure that the leverage effect is controlled, a restriction is added, in this case leverage has been fixed at 1.5x. For this restriction to be abided by, first a check is done: both weights are added together to check whether the sum is greater than the leverage restriction. Then if this holds true

the target weight is divided by the sum of all target weights and then multiplied by the leverage that is desired.

Target Leverage	150,00%			
	Guggenheim Spin-Off ETF		PIMCO Total Return Active ETF	
Date	Target Vol / Hist Vol	Target Weight	Target Vol / Hist Vol	Target Weight
18-Jul-06	36,69%	23,33%	199,22%	126,67%
19-Jul-06	36,10%	24,42%	185,60%	125,58%
20-Jul-06	36,00%	26,35%	168,91%	123,65%
21-Jul-06	32,60%	23,64%	174,25%	126,36%

To achieve the value of 23.33% of the target weight for the Guggenheim Spin-Off ETF on the 18th of July 2006, first a logical check is done, i.e. if 199.22% + 36.69% > 150%, in this case it obviously is. Then to ensure that the leverage is not greater than 150% we divide the 36.69% by the sum of 36.69% + 199.22% then multiply by 1.5. In this way the portfolio guarantees that exposure on a leverage basis does not exceed 150%: (23.33% of the Guggenheim Spin-off ETF plus 126.67% of the PIMCO Total Return ETF equals exactly 150%).

The next challenge for a risk parity portfolio is to be able to leverage on the bond side of the portfolio, to do so bond futures are introduced into the portfolio. A rule was introduced so that the percentage of futures bought corresponded to the overall exposure that the risk parity model suggests. This was done by adding the target weights of both assets together (the Guggenheim ETF and the PIMCO Bond total return fund), and at different levels a 30% increment to the 5 year bond future was added. The following set of rules explain how the futures are added to the portfolio: If the sum of the target weights is less than 100% then no future contracts are added. If the sum of the target weights is greater than 100% then 30% exposure is added to a future contract that is taken away from the PIMCO Bond ETF. If the sum of the target weights is greater than 130% then 60% exposure is added to futures at the expense of the PIMCO bond ETF, and so on. The table below illustrates the rule:

Sum of Target Weights	Weight on Future Contract
<100%	0%
>100%	30%
>130%	60%
>160%	90%

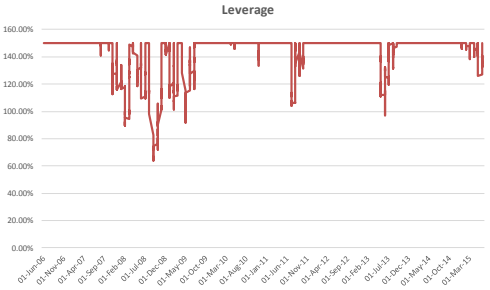
The weight placed in the futures contract is taken from the exposure in the PIMCO ETF, for example if the total exposure by the risk parity rule was 140% and the target weight for the PIMCO ETF was 120% then using the rules above the exposure to all three assets would be as

follows: 20% on the Guggenheim Spin-off ETF, 60% on the PIMCO Bond ETF and finally 60% on the 5-year Treasury note future.

The last step is to calculate the returns which is simply to multiply the weights at period t-1 with the corresponding asset returns at period t. With these returns the following tables and graphs can be presented for the spin off risk parity portfolio. It is important to note that all returns have been adjusted for the bid-ask spread. Moreover, as the bid ask spread of the future contract can be quite volatile a rule has been added whereby if the bid ask spread of the contract is higher than 0.05%, then the previous exposure is maintained.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
January		1.8%	-0.9%	-1.7%	1.8%	1.0%	1.5%	1.5%	1.8%	-0.3%
February		1.1%	-0.3%	3.0%	0.3%	1.0%	1.6%	1.8%	-1.2%	2.2%
March		1.2%	-0.6%	2.1%	1.5%	1.8%	1.8%	0.4%	0.0%	-1.4%
April		0.5%	0.3%	0.6%	-0.1%	1.5%	0.6%	-1.2%	1.8%	0.2%
May		0.0%	-4.2%	-0.3%	0.8%	-0.4%	1.7%	-3.1%	-0.2%	-2.3%
June	1.6%	-1.7%	-0.8%	1.8%	2.0%	0.9%	1.1%	0.4%	-1.3%	-0.5%
July	1.4%	1.4%	2.0%	3.6%	0.7%	-1.3%	0.1%	-1.3%	2.1%	
August	1.5%	1.6%	-3.8%	2.8%	2.8%	-0.9%	2.5%	4.0%	-1.6%	
September	2.7%	0.0%	-5.0%	-0.9%	1.0%	1.2%	0.0%	1.8%	0.2%	
October	2.1%	1.0%	1.6%	3.4%	-0.9%	0.5%	1.7%	0.9%	0.7%	
November	-0.1%	-0.3%	3.7%	-1.4%	0.2%	1.4%	0.0%	-2.0%	-0.2%	
December	0.2%	-1.2%	-2.1%	0.9%	-0.3%	1.3%	0.6%	-0.6%	2.5%	
Annual Return	16.4%	5.5%	-10.1%	13.8%	9.9%	8.0%	13.2%	2.6%	4.6%	-4.2%
Volatility	3.5%	3.8%	9.1%	6.5%	3.7%	3.4%	2.9%	6.8%	4.9%	5.3%
Info Sharpe	4.7	1.4	-1.1	2.1	2.7	2.3	4.6	0.4	0.9	-0.8
Positive Months	85.7%	66.7%	33.3%	66.7%	75.0%	75.0%	91.7%	58.3%	50.0%	33.3%

Average Annual Return	6.06%
Standard Deviation	5.35%
Info Sharpe	1.13
Positive Days	43.3%
Positive Months	58.3%
Daily Skew	-0.20
Daily Kurt	1.83
Daily Max	1.92%
Q3	0.22%
Median	0.02%
Q1	-0.15%
Daily Min	-1.70%

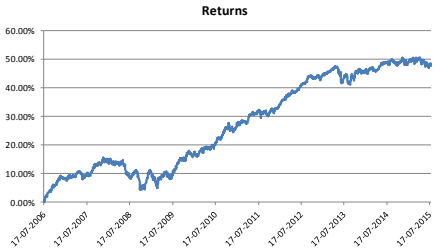


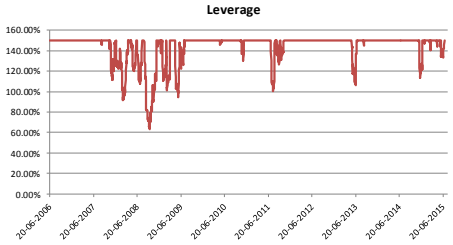
As can be seen above the information Sharpe ratio for this portfolio is about 1.13 which shows that on a risk return basis the model does prove to be, to some degree efficient. However a more comprehensive comparison to the original NSP risk parity model with the SPY ETF shall be evaluated.

Below are the statistics and return series for a risk parity with the same characteristics (same target volatility and same leverage) as the previous model, however instead of the spin-off ETF it contains the S&P 500 ETF.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
January		0.1%	-0.3%	-2.9%	0.4%	1.8%	1.9%	1.2%	-0.7%	1.3%
February		0.6%	0.0%	-1.9%	1.1%	1.1%	1.3%	0.9%	1.5%	0.3%
March		0.1%	-0.8%	2.4%	0.8%	-0.3%	1.4%	0.9%	-0.4%	-0.3%
April		1.5%	-0.4%	0.9%	1.1%	2.2%	1.1%	1.1%	0.1%	-0.7%
May		-0.2%	-0.5%	1.1%	-0.5%	1.2%	0.0%	-2.2%	2.1%	0.3%
June		-1.0%	-3.2%	-1.1%	0.7%	-0.6%	1.0%	-2.6%	0.4%	-1.9%
July	1.8%	0.1%	-0.4%	2.3%	2.4%	0.9%	1.7%	1.2%	-1.1%	0.9%
August	2.1%	1.8%	1.3%	2.1%	0.5%	-0.4%	0.8%	-2.4%	2.0%	
September	1.5%	1.9%	-1.9%	1.6%	2.5%	-1.1%	1.5%	2.2%	-1.5%	
October	1.6%	0.6%	-3.9%	-0.8%	1.3%	1.8%	-0.4%	2.1%	0.3%	
November	1.7%	1.7%	2.1%	3.5%	-0.7%	-0.1%	0.8%	0.9%	1.3%	
December	-0.6%	-0.4%	4.0%	-2.2%	0.3%	1.1%	-1.0%	-0.5%	-1.6%	
Annual Return	16.1%	6.6%	-4.0%	5.0%	9.9%	7.5%	10.0%	2.8%	2.5%	-0.2%
Volatility	3.3%	3.3%	7.4%	7.3%	3.4%	3.8%	3.0%	5.9%	4.5%	3.7%
Info Sharpe	4.9	2.0	-0.5	0.7	2.9	2.0	3.3	0.5	0.6	0.0
Positive Months	83.3%	75.0%	25.0%	58.3%	83.3%	58.3%	83.3%	66.7%	58.3%	57.1%

Average Annual Return	5.34%
Standard Deviation	5.12%
Info Sharpe	1.04
Positive Days	43.0%
Positive Months	58.3%
Daily Skew	-0.08
Daily Kurt	2.72
Daily Max	2.05%
Q3	0.20%
Med	0.02%
Q1	-0.15%
Daily Min	-1.58%





As can be seen by the tables on the previous pages the spin-off risk parity portfolio has superior risk adjusted returns as its Sharpe ratio is 1.13 compared to 1.04 of the S&P risk parity portfolio. Furthermore, the return on average is higher and leads to a higher cumulative return as compared to the S&P risk parity portfolio. The spin off portfolio does however perform worse in 2008, as there is a higher drawdown. This makes sense as by construction spin offs will tend to have a lower market capitalization and low market cap stocks tend to underperform in times of financial market crises. That being said on a long time period the Spin off ETF seems to present higher risk adjusted returns. It is important to note that both strategies are the same except for the equity portion of the portfolio. Hence, the main difference for the outperformance of the Spin off risk parity portfolio relative to the S&P 500 risk parity portfolio is the underlying stocks encompassed in the Spin off ETF. Therefore the following reasons might explain why spin off stocks tend to perform well against the market.

II. Explanation of Spin off Stocks Relative Outperformance

Before attempting to explain spin off stocks relative outperformance it is important to note that a study conducted by Patrick J. Cusatis, James A. Miles and J. Randall Woolridge showed that

spin off companies from 1963 to 1988 outperformed the S&P 500 by about 10% per year[1]. A more recent study by John J. McConnell & Alexei V. Ovtchinnikov (2004) showed that spin offs returns between 1965 and 2000, adjusted for the Fama-French-Carhart four-factor model, still generated ex-post alpha[2]. This illustrates that spin off excess return is not totally explained by the excess returns of the broad market, their market capitalization, their price to book ratio and even momentum. In other words, after adjusting for all these points, returns of spin off stocks still have an exogenous factor not explained by the model and this research herein forth will try to use this fact to make the NSP's returns more efficient. The reasons presented below might shed some light on why alpha is generated even after it is adjusted for the Fama-French-Carhart four-factor model.

One very important point to understand why spin off stocks tend to perform well relative to the market is the overwhelming sell off pressure these stocks tend to incur in the initial phase of their introduction into the market[3]. Sell off pressure tends to happen for a variety of reasons, firstly, pension funds or other large managed funds tend to sell their stake of the new company as its size is too small for an institutional portfolio[4]. Also certain managed funds are only allowed to hold stocks that are in the S&P 500 or hold securities that must have a minimum market capitalization. Therefore once these institutional investors have received the new stock, that is neither the in the S&P 500 or of adequate size, it is sold. Secondly private investors also tend to sell the spun off stock in the early phase. This is because in most cases the part of the business that is spun off into a separate entity is not the core business of the whole company. Usually the private investor has put money into the parent stock due to its core business so when the investor receives the spun off stock it tends to be ignored and sold. A hypothetical

[1] "Restructuring through spinoffs: The stock market evidence" Patrick J. Cusatis, James A. Miles and J. Randall Woolridge (1993)
[2] "Predictability of Long-Term Spinoff Returns" John J. McConnell & Alexei V. Ovtchinnikov (2004)
[3] Pg.60 "You can be a stock market genius" Joel Greenblatt
[4] Pg.61 "You can be a stock market genius" Joel Greenblatt

example would be buying shares of a company that extracts oil that accounts for about 95% of their total business. But the company also has a natural gas business which the company decides to spin off into a separate entity. An investor that has purchased shares in this company has most probably bet on the business of oil extraction therefore, once the shares of the spun off business is received, it would be reasonable to assume the investor would sell his position. This logic can also be applied to fund managers or other institutional investors although we can assume this is less likely for professional investors as we would expect an analysis of the stock before succumbing to the selloff pressure. This being said, as previously mentioned certain cases illustrate that the new issuance is not of an adequate size for an institutional investor. Lastly ETFs that hold the parent company's stock and receive shares of the spun off stock will also most probably have to sell their share as they are trying to replicate returns of a given index. This is true assuming that the spun off stock is not part of the index and thus the ETF's mangers must sell their position of the spun off stock.

These reasons above illustrate that in the aftermath of the spin off there tends to be downward pressure on the price without regard for its intrinsic value. The key narrative is that the stock is being sold without looking into its business model or profitability etc. Essentially, as Joel Greenblatt explains, the spin off process is fundamentally flawed as it "distributes stock to the wrong people"[5]. There may be cases where the initial selling pressure might be warranted, in other words even with all the selling, the stock's value could potentially still be above its 'fair value'. But more importantly is that on average this does not seem to be the case, as previous studies have shown alpha in spin off returns[6]. A key issue can be brought up with timing, in other words, when do these entities sell their share of the spun off stock. Firstly, ETFs whose mandate is to replicate a given index cannot hold stocks that are not in the index they are

[5] Pg.61 "You can be a stock market genius" Joel Greenblatt
[6] "Predictability of Long-Term Spinoff Returns" John J. McConnell & Alexei V. Ovtchinnikov (2004)

following, so their selling must happen as soon as they are able, to ensure that their returns are not skewed. Secondly institutional investors that have restrictions to their investment portfolio must also sell their share of the new issuance assuming it does comply with these rules, for example not having sufficient market cap. Again this selling must happen as soon as the fund can because the fund managers must follow their investment rules. Other investors timing of selling would be harder to predict however as has been already explained private investors tend not to want exposure to the business that has been spun off and the new issuance tends to be too small for institutional investors' portfolio. In this way, although exact timing is virtually impossible to predict the key point is that selling pressure occurs within the early phase of the new issuance. This point shall be addressed further on in the spin off picking process.

Another potential reason for the relative outperformance of the spin off stocks is that new management is autonomous to the parent company and thus has more control over the business. "The combination of accountability, responsibility and more direct incentives take their natural course"[7]. Furthermore, to magnify this effect, management can be given a stake of the new company. Stock options among other equity based incentives can be issued to the management of the spin off which directly ties the equity performance to management compensation. Insider participation is an extremely important point that adds to the spin off strategy's attractiveness. Lastly, another potential reason is that a previously hidden investment opportunity is revealed upon the spin off. One of the common practices when a spin off occurs is that the parent company siphons off debt into the new entity. This high leverage within the spin off magnifies equity returns should the stock gain value over time. For example, if the market value of equity per share was $5 and the debt per share was $25 then the total assets would be $30, a 15% rise in the assets value would lead to a tremendous rise in the stock's value (0.15 x $30 = $4.50). Of course this is a two-way street, the opposite is also true but the main point is that if for some

[7] Pg.61 "You can be a stock market genius" Joel Greenblatt

reason (the ones previously explained) the company succeeds, then the potential gain is much higher due to the leverage effect. Essentially, the point being made here is that high leverage is not desirable but if the total assets of the spin off gain value then the equity returns are magnified and thus, if the reasons above hold true, the potential gain in spin off stocks is on average higher than in the market. In conclusion, there are various potential reasons for spin off outperformance relative to the market however the key point is that the inefficient allocation of the new issuance to people that do not desire them, leaves an investment opportunity.

III. Spin off Risk Parity with Volatility Filters

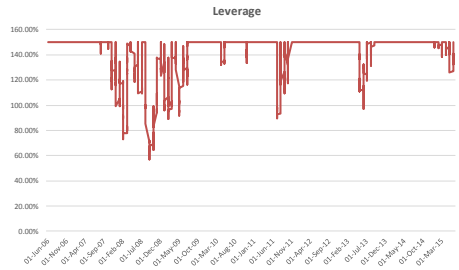
To try and curb the problem of a higher maximum drawdown for the spin off risk parity portfolio, that was previously mentioned, a volatility filter has been introduced into the model. Essentially the objective of the volatility filter is try and reduce the drawdown that the strategy experiences in times of crisis such as the financial crisis of 2008. The key point here is the notion of volatility clusters. Return series' tend to be more leptokurtic and negatively skewed, i.e. there is a tendency for volatility in financial markets to appear in bunches[8]. Moreover, there is a tendency for volatility to rise more after a large price fall than if there was a price rise. Hence volatility tends to be more pronounced after a price fall and appears in clusters. Taking advantage of the knowledge that volatility tends to spike due to a fall in price, a volatility filter might be a good way to reduce exposure in times of negative prices movements. This shall be achieved by implementing a rule that if volatility reaches a certain level the strategy removes all exposure from the equity portion of the risk parity portfolio. The exposure is only then reintroduced if the volatility of the underlying asset is below the same given parameter. In this way the strategy can at least partially offset the losses experienced during a pronounced price fall. In practical terms the volatility filter was introduced by setting a rule that if the volatility

[8] "Introductory Econometrics for Finance" pg. 380 Chris Brooks

of the spin off ETF was greater than 30.9% then exposure from the CDS ETF was removed. The value was chosen by maximizing the Sharpe ratio by changing values for the volatility filter. The results are presented below:

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
January		1.8%	-0.6%	-0.5%	1.8%	1.0%	1.5%	1.5%	1.8%	-0.3%
February		1.1%	-0.4%	1.3%	0.3%	1.0%	1.6%	1.8%	-1.2%	2.2%
March		1.2%	-0.2%	0.7%	1.5%	1.8%	1.8%	0.4%	0.0%	-1.4%
April		0.5%	0.3%	0.3%	0.4%	1.5%	0.6%	-1.2%	1.8%	0.2%
May		0.0%	-4.2%	-0.3%	1.1%	-0.4%	1.7%	-3.1%	-0.2%	-2.3%
June	1.6%	-1.7%	-0.8%	1.8%	2.0%	0.9%	1.1%	0.4%	-1.3%	-0.5%
July	1.4%	1.4%	2.0%	3.6%	0.7%	-2.0%	0.1%	-1.3%	2.1%	
August	1.5%	1.6%	-2.5%	2.8%	2.8%	0.6%	2.5%	4.0%	-1.6%	
September	2.7%	0.0%	-1.8%	-0.9%	1.0%	-0.3%	0.0%	1.8%	0.2%	
October	2.1%	1.0%	3.0%	3.4%	-0.9%	1.1%	1.7%	0.9%	0.7%	
November	-0.1%	-0.3%	3.5%	-1.4%	0.2%	1.3%	0.0%	-2.0%	-0.2%	
December	0.2%	-1.1%	-1.0%	0.9%	-0.3%	1.3%	0.6%	-0.6%	2.5%	
Annual Return	16.4%	5.6%	-2.8%	11.7%	10.7%	7.8%	13.2%	2.6%	4.6%	-4.2%
Volatility	3.5%	3.8%	7.7%	5.7%	3.6%	3.7%	2.9%	6.8%	4.9%	5.3%
Info Sharpe	4.7	1.5	-0.4	2.1	3.0	2.1	4.6	0.4	0.9	-0.8
Positive Months	85.7%	66.7%	33.3%	66.7%	83.3%	75.0%	91.7%	58.3%	50.0%	33.3%

Average Annual Return	6.72%
Standard Deviation	5.22%
Info Sharpe	1.29
Positive Days	43.6%
Positive Months	59.2%
Daily Skew	-0.21
Daily Kurt	1.78
Daily Max	1.60%
Q3	0.21%
Median	0.03%
Q1	-0.14%
Daily Min	-1.70%



As can be seen by the graph above the objective of the volatility filter, to reduce drawdown in 2008/09 or other periods of heightened volatlity, was accomplished. If we compare these results to the previous spin off risk parity strategy without the volatility filter we can see that the drawdown around the end of 2008 is higher, as the cumulative return almost reaches back to 0%. However, with the volatility filter, the cumulative return in the same period is sustanied at around 10%. Furthermore, another positive consequence of the introduction of the volatility filter is that the return series is more stable over time, this would be expected as the portfolio removes exposure to high volatility inherently. Another important point is that the Sharpe ratio has been improved, up to 1.29 against a previous 1.13, and the cumulative return has also increased with the introduction of the volatility filter. For purposes of continued comparison with the S&P risk parity portfolio a volatility filter was added to the previous S&P 500 strategy and the volatility maximum ceiling was placed as 20.4%, as this was the number that maximized the Sharpe ratio. The results showed that the Sharpe ratio was significantly improved as

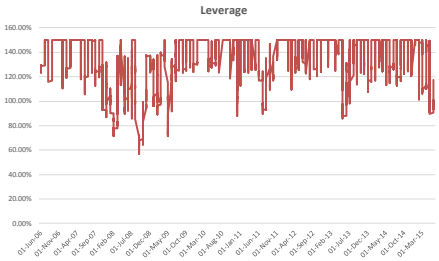
compared to the same strategy without a volatility filter. More importantly though, is that the addition of the volatility filter in the S&P 500 risk parity portfolio still has not surpassed the efficiency of the spin off strategy with a volatility filter.

IV. Spin off Risk Parity with Volatility Filters & Time Trend

Another common characteristic of stock returns is serial correlation, in other words price falls tend to be followed by price falls and price rises tend to be followed by price rises, i.e. momentum[9]. To try and take advantage of this positive serial correlation a time trend has been added to the previous spin off risk parity portfolio with a volatility filter. The idea is to, in conjunction with the volatility filter, lower the exposure to the equity portion when the asset is losing value. The implementation of a time trend dummy variable is done by checking if the price at time t is greater the moving average of the previous 20 days. The dummy variable is then implemented in the portfolio, in other words if the price at time t of the ETF is greater than the average of the prior 20 days then the portfolio goes long on the ETF, if not then exposure is removed. The results of this strategy is presented below:

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
January		1.7%	-1.1%	-0.1%	1.8%	1.0%	1.5%	1.8%	1.9%	-0.3%
February		1.1%	0.0%	2.1%	0.4%	1.0%	1.6%	2.1%	-0.7%	2.2%
March		1.2%	-0.5%	2.2%	2.1%	2.3%	2.0%	0.4%	0.0%	-1.1%
April		0.6%	0.3%	0.6%	0.4%	1.5%	0.6%	-1.0%	1.8%	0.3%
May		0.0%	-4.1%	0.1%	0.5%	-0.4%	1.8%	-2.5%	0.2%	-2.3%
June	1.6%	-1.7%	-0.8%	2.2%	2.3%	1.6%	1.2%	0.6%	-1.3%	-0.1%
July	1.4%	1.3%	2.0%	3.6%	0.7%	-1.5%	0.1%	-1.3%	2.1%	
August	1.4%	1.7%	-3.6%	2.8%	2.8%	-1.4%	2.7%	4.3%	-1.6%	
September	2.8%	0.0%	-1.4%	-0.3%	1.3%	1.1%	0.0%	1.8%	0.7%	
October	2.1%	0.9%	2.6%	3.4%	-0.9%	0.8%	1.7%	0.9%	0.7%	
November	0.0%	-0.4%	2.6%	-1.3%	0.3%	1.4%	0.1%	-2.0%	-0.2%	
December	0.3%	-1.2%	-0.9%	1.5%	0.2%	1.5%	0.8%	-0.1%	2.9%	
Annual Return	16.4%	5.3%	-4.8%	16.7%	11.9%	8.8%	14.1%	5.2%	6.5%	-2.6%
Volatility	3.3%	3.8%	7.4%	5.4%	3.8%	4.1%	3.0%	6.7%	4.9%	5.1%
Info Sharpe	4.9	1.4	-0.6	3.1	3.2	2.1	4.7	0.8	1.3	-0.5
Positive Months	85.7%	66.7%	41.7%	75.0%	91.7%	75.0%	91.7%	58.3%	66.7%	33.3%

Average Annual Return	5.86%
Standard Deviation	4.99%
Info Sharpe	1.17
Positive Days	43.1%
Positive Months	60.0%
Daily Skew	-0.21
Daily Kurt	2.23
Daily Max	1.60%
Q3	0.20%
Median	0.02%
Q1	-0.14%
Daily Min	-1.75%

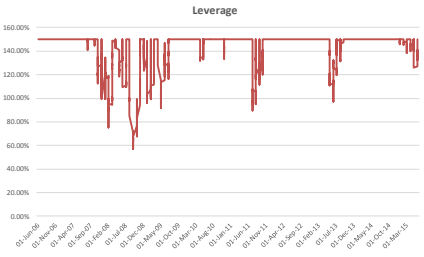


[9] "Time Series Momentum Trading Strategy and Autocorrelation Amplification" K. J. Hong and S. Satchell (June 2013)

The results above illustrate that the addition of the time trend has led to a lower Sharpe ratio. This is probably due to the high costs associated with removing or adding exposure to the ETF over time, thus the evidence seems to suggest that a time trend has not improved the efficiency of the portfolio. However, the addition of a time trend might be interesting to introduce for another purpose. By definition volatility rises with accentuated price movements either up or down, however volatility tends to spike more when the price of an asset falls. There are times when the price rebounds but the volatility filter has been triggered. In other words, the strategy misses the rebound in the price because the volatility of the past 20 days is still above the volatility ceiling implemented. The idea is then to introduce a time trend to combat this issue. This is done by having a dummy variable that equals 1 if the volatility filter has been triggered and the price of the ETF at time t is greater than the moving average of the previous 20 days. In this way the strategy can attempt to benefit from price rebounds after accentuated falls even if the volatility of the previous 20 days is still above the trigger. The results of this portfolio are presented below:

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
January		1.8%	-1.4%	0.0%	1.8%	1.0%	1.5%	1.5%	1.8%	-0.3%
February		1.1%	-0.6%	2.1%	0.3%	1.0%	1.6%	1.8%	-1.2%	2.2%
March		1.2%	-0.6%	2.4%	1.5%	1.8%	1.8%	0.4%	0.0%	-1.4%
April		0.5%	0.3%	0.6%	0.6%	1.5%	0.6%	-1.2%	1.8%	0.2%
May		0.0%	-4.2%	-0.3%	0.5%	-0.4%	1.7%	-3.1%	-0.2%	-2.3%
June	1.6%	-1.7%	-0.8%	1.8%	2.0%	0.9%	1.1%	0.4%	-1.3%	-0.5%
July	1.4%	1.4%	2.0%	3.6%	0.7%	-2.1%	0.1%	-1.3%	2.1%	
August	1.5%	1.6%	-2.5%	2.8%	2.8%	-1.6%	2.5%	4.0%	-1.6%	
September	2.7%	0.0%	-1.8%	-0.9%	1.0%	0.8%	0.0%	1.8%	0.2%	
October	2.1%	1.0%	2.6%	3.4%	-0.9%	0.2%	1.7%	0.9%	0.7%	
November	-0.1%	-0.3%	3.4%	-1.4%	0.2%	1.4%	0.0%	-2.0%	-0.2%	
December	0.2%	-1.5%	-1.7%	0.9%	-0.3%	1.3%	0.6%	-0.6%	2.5%	
Annual Return	16.4%	5.2%	-5.4%	14.9%	10.3%	5.9%	13.2%	2.6%	4.6%	-4.2%
Volatility	3.5%	4.0%	7.6%	5.7%	3.6%	4.3%	2.9%	6.8%	4.9%	5.3%
Info Sharpe	4.7	1.3	-0.7	2.6	2.9	1.4	4.6	0.4	0.9	-0.8
Positive Months	85.7%	66.7%	33.3%	75.0%	83.3%	75.0%	91.7%	58.3%	50.0%	33.3%

Average Annual Return	6.49%
Standard Deviation	5.25%
Info Sharpe	1.24
Positive Days	43.4%
Positive Months	60.0%
Daily Skew	-0.19
Daily Kurt	1.80
Daily Max	1.74%
Q3	0.22%
Median	0.02%
Q1	-0.14%
Daily Min	-1.70%



The addition of a rule to try and benefit from the rebound in price usually felt after a pronounced price decline has improved as compared to the prior strategy (volatility filter & time trend). Nevertheless, this strategy still has a lower the Sharpe ratio and average return as compared to

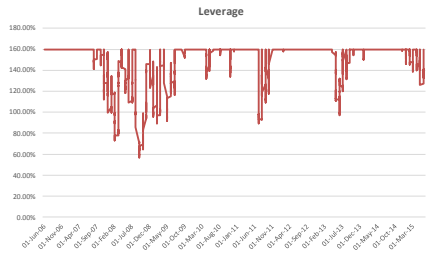
the Spin off risk parity strategy with only a volatility filter. This is probably due to the fact that completely removing exposure from the equity portion and then adding it back leads to higher costs in bid ask terms and thus does not lead to more efficient returns. After testing for different variants of the spin off risk parity portfolio evidence suggests that the spin off risk parity with a volatility filter is the most efficient.

V. Testing Different Leverage Levels with a Volatility Filter

In the analysis so far the leverage has been maintained at 1.5x, however leverage can be raised to try and benefit from periods of relative calm markets. Inherently the risk parity portfolio will weight assets inversely to their volatility, but if the leverage has a ceiling it may not allow the strategy to achieve its true performance. This restriction almost entirely relates to the bond portion of the risk parity strategy. In the sense that when the leverage is restricted it does not allow the bond exposure to be at its 'natural' level given by the risk parity computations. This can be seen in the previous graphs for all strategies, which show leverage at a ceiling of 150% at certain times. When the leverage hits a ceiling this most probably illustrates that the 'natural' weighting for the bond portion of the strategy should be higher. Therefore, altering the leverage amount might be a good way to try and extract all value that the risk parity strategy provides. It is important to note that the amount of leverage is restricted to 2x as the notional amount that can be traded in futures in restricted to €100,000. This is a practical restriction due to the notional amount the NSP fund invests and thus there might be higher leverage amounts that will lead to more efficient strategies, but they cannot be considered in this analysis. For the spin off risk parity with a volatility filter the leverage amount has been changed with the goal of maximizing the Sharpe ratio. The leverage amount that was reached was 1.6x and the results are the following:

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
January		1.9%	-0.6%	-0.5%	1.9%	1.1%	1.6%	1.6%	1.9%	-0.3%
February		1.1%	-0.4%	1.3%	0.4%	1.0%	1.8%	1.9%	-1.2%	2.3%
March		1.3%	-0.2%	0.7%	1.7%	1.9%	1.9%	0.4%	0.0%	-1.6%
April		0.6%	0.2%	0.4%	0.4%	1.6%	0.6%	-1.3%	1.9%	0.2%
May		0.0%	-4.2%	-0.3%	1.1%	-0.4%	1.9%	-3.1%	-0.1%	-2.4%
June	1.8%	-1.8%	-0.9%	1.8%	2.2%	1.0%	1.3%	0.4%	-1.4%	-0.5%
July	1.5%	1.5%	2.1%	3.6%	0.8%	-2.2%	0.1%	-1.4%	2.3%	
August	1.6%	1.6%	-2.6%	3.0%	2.9%	0.5%	2.8%	4.0%	-1.7%	
September	3.0%	0.0%	-1.8%	-0.9%	1.1%	-0.3%	0.0%	1.9%	0.2%	
October	2.3%	1.0%	3.0%	3.5%	-1.0%	1.2%	1.8%	0.9%	0.8%	
November	-0.1%	-0.4%	3.5%	-1.4%	0.2%	1.4%	0.0%	-2.1%	-0.2%	
December	0.2%	-1.1%	-1.2%	1.0%	-0.3%	1.4%	0.7%	-0.6%	2.7%	
Annual Return	17.7%	5.9%	-3.1%	12.2%	11.3%	8.3%	14.5%	2.7%	5.1%	-4.4%
Volatility	3.7%	4.0%	7.8%	5.9%	3.8%	4.0%	3.1%	7.0%	5.2%	5.5%
Info Sharpe	4.8	1.5	-0.4	2.1	3.0	2.1	4.6	0.4	1.0	-0.8
Positive Months	85.7%	66.7%	33.3%	66.7%	83.3%	75.0%	91.7%	58.3%	58.3%	33.3%

Average Annual Return	7.17%
Standard Deviation	5.45%
Info Sharpe	1.32
Positive Days	43.6%
Positive Months	60.0%
Daily Skew	-0.22
Daily Kurt	1.66
Daily Max	1.59%
Q3	0.23%
Median	0.03%
Q1	-0.15%
Daily Min	-1.70%



From the table above the most important difference, from the same strategy but with lower leverage, is the higher Sharpe ratio. Illustrating that with higher leverage the strategy has managed to increase its efficiency. Another important result is that average annual return has also increased leading to a higher cumulative return.

VI. Comparison of Strategies

The table below illustrates results for the other strategies herein mentioned to provide a basis for comparison with the spin off risk parity with volatility filters and leverage at 1.6x. It is important to note that for comparative reasons the strategies below also have the leverage that maximizes their Sharpe ratio, within the same limits as previously mentioned.

	S&P 500 Risk Parity	Spin Off Risk Parity	S&P RP & Vol Filter	Spin Off RP & Vol Filter	Spin Off RP Vol Filter & Time Trend	Spin Off RP Vol Filter & Time Trend 2
Average Annual Return	5.74%	6.53%	6.41%	**7.17%**	6.22%	6.95%
Standard Deviation	5.35%	5.57%	5.28%	**5.45%**	5.21%	5.48%
Info Sharpe	1.07	1.17	1.21	**1.32**	1.19	1.27
Leverage	1.6x	1.6x	1.6x	**1.6x**	1.6x	1.6x

As can be seen by the table above the other strategies still do not match the efficiency of the spin off risk parity with a volatility filter and leverage at 1.6x.

VII. Spin Off Risk Parity Strategy with Selective Stock Picking

Now that there is evidence to suggest that the spin off risk parity portfolio is significantly more efficient than the original NSP S&P 500 risk parity portfolio the remainder of this analysis will build an investment strategy to select certain spin offs in an attempt to improve the portfolio's Sharpe ratio. Firstly, before constructing a spin off stock picking strategy, an investment universe must be compiled. As such, a list was complied with the following conditions: firstly, the spin offs must come from companies that are in the S&P 500 Index. The reason for this condition is to try and accentuate the selloff pressure that emanates from institutional investors. Essentially, the rationale builds on the notion that institutional investors will have higher exposure to S&P 500 stocks due to, for example, investment restrictions, or a general higher tendency toward large cap stocks, among other reasons. Secondly the spin offs must have been completed by the date 19th of June 2006 onwards to ensure comparability to the previous portfolios. Thirdly, all spin offs must be publically traded, thus private companies that arise from spin offs were eliminated from the list for obvious reasons. Lastly, all spin offs must trade on US exchanges, this is a limitation by the NSP investment policy which only invests in US markets. Once all these conditions are satisfied the investment universe is left with approximately 200 spin off stocks. The idea now is to filter stocks in an attempt to capitalize from the potential reasons why spin offs tend to outperform the market, these reasons being: A) sell off pressure in the beginning of their life B) benefits of autonomous management with equity based incentives and C) a hidden investment opportunity revealed in the aftermath of the spin off. Two of the potential reasons are relatively easy to quantify, point A can be quantified by checking the returns of the spin offs from their inception until different time frames, 1 month, 2 months etc. Point B has two parts, one being the benefits that arise from autonomous management and the second being equity incentives. The benefits of autonomous management should potentially occur once the company has been spun off from its parent, thus quantifying

this section is nonsensical, as spin offs by definition become autonomous. The equity incentives part can be measured by gathering information on the percentage of the stock held by management at the time of the completion of the spin off. Equity incentives align shareholders' objectives with management and bolsters the potential positive effects of autonomous management making it an extremely important part of the strategy[10]. It is important to note that, although any company can have equity incentives, the equity incentives within a recently spun off company magnifies the positive effects of autonomous management. To quantify this equity incentive part, information was gathered on the percentage of stock insiders held at the date of completion of the spin off. Bloomberg has data for this from March 2010 to the present date however certain issuances occurred before March 2010. Thus, to ensure that all stocks in the investment list are on an equal footing, information was gathered by checking the spin off company's SEC filings. Information for the percentage of insiders that hold the new issuance was found in the form 10-12B for all spin off companies that occurred prior to March 2010. Point C is a case by case rationale and thus not eligible for comparison. What is a hidden investment opportunity for one company might not be for another. For example, high leverage in one company might represent a boon for potential returns but another spin off with no leverage is not hindered by a lack of debt. Although hidden opportunities that arise from spin offs are an important factor for their success it will not be addressed in this investment strategy as it is not a comparable point.

VIII. Construction of Investment Strategy

Now that points A and B can be quantified, point B's objective is to filter out stocks whilst point A will serve as a tool to maximize the portfolio's Sharpe ratio once the stocks have been implemented into the risk parity portfolio. What this means is that the degree of the

[10] "Managerial Compensation and Corporate Spinoffs" Emilie R. Feldman - Strategic Management Journal

management's stake of the spun off company will determine which stocks enter the risk parity portfolio whilst the timing to buy then to sell the new issuance will be determined by conducting a sensitivity analysis to maximize the efficiency of the return series, i.e. test different time frames for when to buy and sell in order to maximize the Sharpe of the entire portfolio. The condition that was introduced to filter out spin off stocks was to only include companies where insiders had more than 10% of the new company at the time of the new issuance. This is an extremely high percentage and was chosen as such to try and hone in on companies where management has a large incentive to ensure that the share price goes up. This filter in itself removes a lot of the stocks from the list and leaves the following 13 stocks:

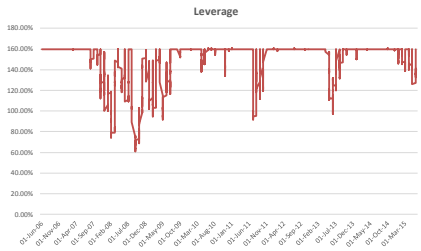
Company Name	Completion Date	Target Ticker	Insider %
Chipotle Mexican Grill Inc	05-10-2006	CMG US Equity	12%
EchoStar Corp	02-01-2008	SATS US Equity	58%
Brookfield Infrastructure Partners LP	10-01-2008	BIP US Equity	39%
A H Belo Corp	11-02-2008	AHC US Equity	15%
Scripps Networks Interactive Inc	01-07-2008	SNI US Equity	32%
iBio Inc	19-08-2008	IBIO US Equity	71%
Altisource Portfolio Solutions SA	10-08-2009	ASPS US Equity	28%
MSG Networks Inc	10-02-2010	MSGN US Equity	56%
ClearSign Combustion Corp	24-05-2012	CLIR US Equity	17%
Altisource Residential Corp	14-12-2012	RESI US Equity	28%
Gaming and Leisure Properties Inc	04-11-2013	GLPI US Equity	10%
BioTime Inc	02-10-2014	BTX US Equity	11%
Patriot Transportation Holding Inc	02-02-2015	PATI US Equity	10%

The following stocks were then introduced into the spin off risk parity portfolio. As each stock is introduced into the portfolio, exposure is removed from the Guggenheim Spin off ETF. It is important to note that if enough stocks have exposure at any one time the minimum exposure to the Guggenheim Spin off ETF is 0%. In other words, there is never a negative weighting to the spin off ETF. Although theoretically negative exposure to the spin off ETF would be desirable as a hedge, it is not possible as futures do not exist on this ETF. The spin off picks have an exposure of 1%, as this is the NSP policy. For clarification purposes, the stock picks were added to the spin off risk parity with a volatility filter at 30.9% and leverage at 1.6x, which was previously considered the most efficient portfolio. Once the stocks have been introduced a sensitivity analysis was performed to try and determine the best time frame to buy and then sell the stock pick. This was done by altering the time frame using incremental changes of one

month to maximize the Sharpe ratio of the entire portfolio. The solution that the model suggests is buying the spin off stock six months after its issuance and selling it after holding the stock for two years. Curiously, timing to buy the spin off is the same as the Beacon spin off Index, as they also buy the issuance after six months. However, the timing to sell is different, as the Beacon Index sells the stock after a holding period of three years; this model has placed the selling after a holding period of 2 years. Below are the tables and graphs of the spin off risk parity strategy with selective stock picking:

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
January		1.9%	-0.8%	-2.0%	2.3%	0.9%	1.6%	1.7%	1.6%	-0.2%
February		1.1%	-0.2%	2.6%	0.1%	0.9%	1.8%	2.1%	-1.0%	2.3%
March		1.3%	-0.4%	2.4%	1.7%	2.0%	2.0%	0.7%	-0.2%	-1.6%
April		0.8%	0.1%	-0.4%	0.6%	1.7%	0.7%	-1.5%	1.8%	0.0%
May		0.0%	-4.2%	-0.5%	1.3%	-0.3%	1.9%	-3.0%	-0.2%	-2.5%
June	1.8%	-1.7%	-1.0%	2.5%	2.5%	1.0%	1.2%	0.3%	-1.4%	-0.6%
July	1.5%	1.6%	1.8%	4.1%	1.0%	-2.1%	0.1%	-1.3%	2.1%	
August	1.6%	1.8%	-2.7%	3.4%	3.1%	0.5%	2.8%	3.8%	-1.9%	
September	3.0%	0.1%	-2.8%	-0.8%	0.9%	0.1%	0.0%	2.1%	0.1%	
October	2.3%	1.0%	1.9%	3.5%	-0.6%	1.2%	1.8%	0.6%	0.7%	
November	-0.1%	-0.3%	3.9%	-1.1%	0.2%	1.5%	-0.1%	-1.3%	-0.3%	
December	0.2%	-1.2%	-1.4%	0.6%	0.2%	1.4%	0.6%	-0.6%	2.8%	
Annual Return	17.7%	6.6%	-5.7%	14.4%	13.2%	8.6%	14.4%	3.6%	4.0%	-5.4%
Volatility	3.7%	4.1%	7.8%	7.3%	3.9%	3.9%	3.2%	6.7%	5.1%	5.7%
Info Sharpe	4.8	1.6	-0.7	2.0	3.4	2.2	4.5	0.5	0.8	-0.9
Positive Months	85.7%	75.0%	33.3%	58.3%	91.7%	83.3%	83.3%	58.3%	50.0%	33.3%

Average Annual Return	7.36%
Standard Deviation	5.46%
Info Sharpe	1.35
Positive Days	43.5%
Positive Months	60.0%
Daily Skew	-0.22
Daily Kurt	1.62
Daily Max	1.66%
Q3	0.23%
Median	0.03%
Q1	-0.15%
Daily Min	-1.62%



As can be seen above, selecting spin off stocks based on management's stake of the company seems to be more efficient than broad exposure to a spin off ETF. It is important to note that the average annual return has risen, as compared to the spin off risk parity portfolio without selective stock picking. Moreover, the Sharpe ratio has also been improved, albeit to 1.35 from 1.32. Although, as expected, average annual return is higher, insofar as exposure is more concentrated on fewer stocks, the more pertinent point to be made is that returns are higher in conjunction with a higher Sharpe. Thus by picking certain spin off stocks the strategy has made the risk return profile more efficient and also managed to increase the cumulative return. Nevertheless, the drawdown experienced in 2008 has risen slightly as compared to a broad exposure to the spin off ETF. Although, this does somewhat compromise the results, the key

point is that with fewer stocks the risk return profile has been increased. Therefore, the results seem to provide evidence that selective picking of certain spin off stocks may favor a broad exposure of spin off issuances.

It is important to understand how each stock has performed in the portfolio and thus the table below illustrates the stock pick's performance. All stocks are bought at the ask price and sold at the bid price.

Company Name	Insider %	Buy Date	Sell Date	Holding Period Return	Spin off Index Return
Chipotle Mexican Grill Inc	12%	03/04/2007	02/04/2009	9.2%	-54.2%
EchoStar Corp	58%	30/06/2008	30/06/2010	-38.9%	-8.2%
Brookfield Infrastructure Partners LP	39%	08/07/2008	08/07/2010	-12.3%	-3.3%
A H Belo Corp	15%	09/08/2008	09/08/2010	55.3%	-1.6%
Scripps Networks Interactive Inc	32%	28/12/2008	28/12/2010	148.6%	113.2%
iBio Inc	71%	15/02/2009	15/02/2011	2370.6%	107.6%
Altisource Portfolio Solutions SA	28%	06/02/2010	06/02/2012	137.1%	40.2%
MSG Networks Inc	56%	09/08/2010	08/08/2012	86.1%	39.8%
ClearSign Combustion Corp	17%	20/11/2012	20/11/2014	30.3%	67.8%
Altisource Residential Corp	28%	12/06/2013	12/06/2015	4.5%	29.6%
Gaming and Leisure Properties Inc	10%	03/05/2014	30/07/2015	-9.0%	3.7%
BioTime Inc	11%	31/03/2015	30/07/2015	-36.6%	-4.3%

It is important to note that the average holding period return for all the stocks is around 230%. Moreover, the last column depicts the Beacon's Spin off Index's return in the same period as the stock adjacent. Looking at each stock's return a few returns' stand out. Firstly, the 2370% return on iBio is outstanding, curiously it is also the stock where management has the highest stake of the company (71%). At first glance this does seem to suggest that a high management stake would lead to higher returns however it is also important to note that the timing of buying the stock occurs in the aftermath of the financial crash in 2008. This would essentially greatly potentiate the returns as the timing to buy the stock occurred right after a major price fall. Nonetheless, the 2370% rise is still impressive especially considering that the Beacon Spin off Index's return in the same period is 107%. Another stock which stands out is EchoStar which has the lowest holding period return. Curiously, this stock seems to be the inverse of iBio for two reasons, firstly it was bought just before the market crash of 2008 and secondly it has the second highest insider percentage of the company. Furthermore, the EchoStar stock does

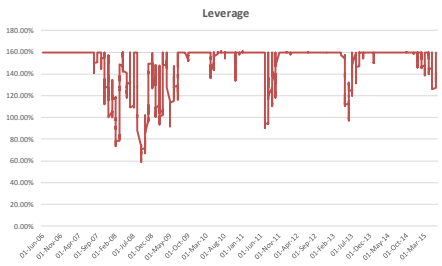
significantly underperform the spin off index which only falls -8.2% whilst the stock falls -38.9%.

IX. Trying to Benefit from Price Falls after the Spin off

So far the model for picking individual spin off positions has been to check management's stake of the new company and if it was above 10% then the stock would enter the portfolio. The selloff pressure (point A), one of the reasons for spin off stocks outperformance against the market, was addressed by altering the buying and selling time frames to optimize the Sharpe ratio of the entire portfolio. However, it was not used as a mechanism to determine which stocks enter the portfolio. This being said, stocks that had a significant sell off in the aftermath of their introduction into the market could potentially represent a better investment opportunity as opposed to spin offs that did not succumb to selloff pressure in their early life cycle. Therefore it might be interesting to use the change in price after six months of the issuance as a tool to discriminate between the spin off stocks. The idea here is not to remove the spin offs that experienced a price increase, but instead place a higher weighting into spin off securities that experienced a price decline. Essentially, what has been done is to place a 1% exposure to spin off stocks where management has at least a 10% stake of the company and a price decline in the six months (or whichever period where it is bought) greater than 5%, otherwise the exposure is 0.5%. These percentages were chosen because, as previously explained, the highest exposure to an individual position is of 1%. What this new addition to the investment strategy attempts to do is take advantage of the price decline in the hope of further profiting from the relative outperformance of spin off stocks. Below are the results:

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
January		1.9%	-0.7%	-1.9%	2.3%	0.9%	1.6%	1.7%	1.7%	-0.3%
February		1.1%	-0.3%	2.3%	0.2%	1.0%	1.8%	2.0%	-1.1%	2.3%
March		1.3%	-0.3%	2.4%	1.7%	2.0%	1.9%	0.6%	-0.1%	-1.6%
April		0.7%	0.2%	-0.3%	0.5%	1.6%	0.7%	-1.4%	1.9%	0.1%
May		0.0%	-4.2%	-0.5%	1.3%	-0.4%	1.9%	-3.1%	-0.2%	-2.4%
June	1.8%	-1.7%	-0.9%	2.6%	2.5%	1.0%	1.2%	0.4%	-1.4%	-0.5%
July	1.5%	1.6%	1.9%	4.0%	1.0%	-2.2%	0.1%	-1.3%	2.2%	
August	1.6%	1.7%	-2.5%	3.4%	3.0%	0.5%	2.8%	3.9%	-1.8%	
September	3.0%	0.0%	-2.6%	-0.8%	1.0%	-0.1%	0.0%	2.0%	0.2%	
October	2.3%	1.0%	2.3%	3.5%	-0.6%	1.2%	1.8%	0.8%	0.8%	
November	-0.1%	-0.3%	3.8%	-1.1%	0.2%	1.4%	0.0%	-1.7%	-0.2%	
December	0.2%	-1.1%	-1.4%	0.6%	0.2%	1.4%	0.7%	-0.6%	2.8%	
Annual Return	17.7%	6.3%	-4.8%	14.3%	13.2%	8.3%	14.4%	3.1%	4.6%	-4.9%
Volatility	3.7%	4.0%	7.8%	7.1%	3.8%	3.9%	3.2%	6.8%	5.1%	5.6%
Info Sharpe	4.8	1.6	-0.6	2.0	3.5	2.1	4.6	0.5	0.9	-0.9
Positive Months	85.7%	75.0%	33.3%	58.3%	91.7%	75.0%	83.3%	58.3%	50.0%	33.3%

Average Annual Return	7.42%
Standard Deviation	5.45%
Info Sharpe	1.36
Positive Days	43.6%
Positive Months	59.2%
Daily Skew	-0.21
Daily Kurt	1.64
Daily Max	1.65%
Q3	0.23%
Median	0.03%
Q1	-0.15%
Daily Min	-1.66%



As can be seen by the graphs and tables above trying to benefit from the price fall after the inception of the spin off has slightly worked as intended. Sharpe has marginally increased and the average annual return has increased very slightly as well. This seems to suggest that trying to benefit from the price decline by placing a higher weighting to these stocks in the aftermath of the new issuance does work, albeit very slightly. Therefore this portfolio does add some benefits to the strategy as compared to the previous stock selection method whereby 1% exposure was the same for all stocks.

After examining various strategies in an attempt to improve the NSP's portfolio this research seems to suggest that the spin off risk parity portfolio with spin off selection is the most efficient strategy. This strategy has the following characteristics:

	Spin Off RP w/ Vol Filter & Selective Picking
Average Annual Return	7.42%
Standard Deviation	5.45%
Info Sharpe	1.36
Leverage	1.6x
Volaility Filter	30.90%
Weight in Pick (if price deline is greater than 5%)	1.00%
Weight in Pick (otherwise)	0.50%
Buy Period (yrs)	0.5
Sell Period (yrs)	2

X. Limitations of the Spin off Strategy

Although the strategy appears to present better results than the S&P 500 risk parity portfolio there are certain limitations to the model that must be addressed. The first issue with a risk parity portfolio in general is that the strategy tends not to perform well in periods of interest rate rises. This concern is due to bond prices falling during periods of hiking interest rates. As the strategy inherently is leveraged on bonds it will perform poorly. Nevertheless a paper conducted by Roberto Croce Ph.D., Rusty Guinn & Lee Partridge (2013) illustrated that a risk parity portfolio between the periods of January 1971 and December 1981, where interest rates rose from trough levels to their peak, still performed well and beat a similar risk return portfolio of 60% equities and 40% bonds. Although this result may not seem intuitive, the main reason they presented was that volatility is dynamic. In the sense that as volatility rises due to poor performance of the underlying asset, inherently the risk parity portfolio lowers the weight to the corresponding asset. The important conclusion here is that although rising interest rates would not be preferable for a risk parity portfolio, the strategy, according to this study, would still generate nominal positive returns and outperform an allocation strategy with comparable volatility (a 60/40 portfolio)[11].

A second issue, and probably one of the more pertinent limitations, is the innate survivorship bias within the spin off selection process. Certain spin offs might have satisfied the criteria of entry to the portfolio only then to go bankrupt. As information on these issuances is unavailable, it can be concluded that the major limitation of the stock selection process is that spin offs that went bankrupt cannot be analyzed and either rejected or accepted into the portfolio. In other words, there might have been spin off issuances that satisfied the stock selection criteria, however they could not be analyzed due to lack of data.

[11] "Risk Parity in a Rising Rates Regime" Roberto Croce Ph.D., Rusty Guinn & Lee Partridge (2013)

A third issue that also comes from the spin off stock selection process is overfitting. In essence, by trying to maximize the Sharpe ratio and ultimately average annual return by changing static variables, this will inherently lead to committing an overfitting error. In this case overfitting could occur because the model is trying to maximize Sharpe by changing variables only looking at a specific period in time, in this case from around 2006-2015. An out of sample analysis with the optimal variables that were achieved could be a good way to check if the model still works for other periods. However this was not conducted as the time period is already short. It is important to note that the risk parity weights are a day by day construction thus overfitting here is not an issue, the issue arises when static variables are optimized for a certain period. Nevertheless, although the model might induce an overfitting error the basic premise that the spin off risk parity portfolio outperforms an S&P 500 risk parity portfolio still holds.

Another issue with the proposed strategy is that the time frame is too short as compared to an S&P 500 risk parity portfolio. With a short time frame comparison, it could be concluded that the results are not robust enough to conclude that this strategy beats the S&P 500 risk parity portfolio. Although, this argument can be utilized it is important to note that a study conducted by Patrick J. Cusatis, James A. Miles and J. Randall Woolridge (1993) showed that spin off stocks outperformed the S&P 500 by 10% per year from 1963 to 1988[12]. Moreover, as previously explained spin offs returns between 1965 and 2000, adjusted for the Fama-French-Carhart four-factor model, still generated ex-post alpha[13]. So, although the time frame for comparison might not be long enough there are still arguments, provided by other studies that a spin off strategy works over time. Although these studies do not prove the validity of superior

[12] "Restructuring through spinoffs: The stock market evidence" Patrick J. Cusatis, James A. Miles and J. Randall Woolridge (1993)

[13] "Predictability of Long-Term Spinoff Returns" John J. McConnell & Alexei V. Ovtchinnikov (2004)

returns in a risk parity portfolio setting, it does illustrate that over a longer time period a spin off strategy does provide alpha.

XI. Conclusion & Future Tips for NSP analysts

In conclusion, the spin off strategy has improved the NSP portfolio's risk return profile and has increased its annual average return, thus the main objective of this Field Lab Research has been achieved. The main advantage of the spin off portfolio from an overall point of view is that the addition of a spin off ETF has allowed for a greater Sharpe ratio when compared to an S&P risk parity portfolio. Moreover, the addition of selective picking of spin offs helped increase the Sharpe ratio more significantly showing that by picking certain spin off stocks, returns can be greater. The reason the addition of spin offs enhances the risk return profile of the fund seems to stem from the inefficiency of the new issuance, in the sense that the new stock is given to people that do not desire it. In essence, the spin off risk parity portfolio with selective picking uses this inefficiency in our favor and has improved the NSP's portfolio.

For future NSP analysts, the main lesson from this research is that all spin offs that could occur should be looked into as a possible investment opportunity. Firstly, because spin offs tend to outperform the general market. Secondly, looking deeper into the spin off than just blind buying leads to even higher potential returns. As to investigating future spin offs a few pointers shall be presented in an attempt to help NSP analysts. Looking into insiders is a very good indicator for picking spin offs but there is another that this research overlooked as it is not a comparable point. Options that are given to mangers should also be analyzed, spin off companies that issue stock options to management is a telltale sign of a better investment opportunity as compared to spin offs that do not issue stock options to their management. The amount of stock options given to management can be seen on the form 12-10B of the company's SEC filings. Another point to look into is the timing of buying instead of placing a six-month period to buy it, it could

be more beneficial to look at the price changes after its issuance and then try to time the buying. What this means is that the spin off stock would be monitored and for example after a major price decline exposure would be added, instead of waiting for six months after issuance.

Therefore in conclusion, this Field Lab Research has at the very least shown how spin off securities provide high returns against the market and hence should be investigated hereinafter to improve the NSP's risk return profile.

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